

and

(d) subsequent to ~~step~~ (c) forming an insulating film on the surface as obtained in step (c).

24. A semiconductor device manufacturing method according to claim 23, wherein the insulating film is a silicon-containing insulating film which is formed by a thermal chemical vapor deposition employing a reaction gas that contains ozone and tetraethylorthosilicate.--

REMARKS

A petition for a two month extension of time has today been filed as a separate paper and a copy is attached hereto.

The specification and abstract have been revised to place them in better English form. The "Substitute Specification and Abstract" submitted herewith contains no new matter. In order that the examiner can satisfy himself in this regard, also submitted herewith is a marked-up copy of the specification and abstract from which the "Substitute Specification and Abstract" was typed.

The newly added claims roughly correspond to the original claims as follows:

^{new} <u>Original Claim</u>	^{old} <u>New Claim</u>
16	6
17	2
18	3

19	4
20	12
21	7
22	12
23	11
24	12

Support for limitations of claim 16 not present in original claim 6 is found at page 15, line 5-18. Regarding the two-step protocol (treatments in sequence), also see page 21, lines 27 to page 25, line 4.

Responsive to the examiner's objection to the drawings, also submitted herewith is a Request for Approval of Drawing Changes.

The rejection under 35 USC 112 is at least partially moot. The examiner will note that the terminology "hydrogen peroxide water" has been changed throughout applicants' specification, claims and drawings to read "aqueous hydrogen peroxide", as per his suggestion.

Further, the term "heat-insulating" as used in original claim 1 has been replaced by the term "heating". This latter amendment is consistent with the definition of "heat-insulating" explained at page 32, line 12 to page 33, line 14.

Regarding the examiner's objection to the term "derivative" in claim 6, replaced here by claim 16, the examiner will note that the agents in question have now been further defined as "an etchant" and as "an oxidizing agent", respectively. It is respectfully submitted that one skilled in the art would know what is and what is not, for example, a derivative of hydrazine and would

they be able to select suitable etchants from within that group without undue experimentation. That one skilled in the art could determine what is and what is not within the scope of the claim is all that is required by the definiteness requirement of 35 USC 112, second paragraph. See *In re Conley*, 180 USPQ 454 at 456 (CCPA 1974).

Responsive to the examiner's objection to the claims, the claims have been amended and rewritten so that no dependent claim is separated by any claim which does not also depend from the claim upon which that dependent claim depends.

The rejection for anticipation by Kokai 05-34394 is believed to be moot in light of the present claim amendments. While the English language abstract of the Kokai publication is somewhat confusing, what the Kokai publication actually discloses is a series of treatments: "ammonia/hydrogen peroxide" → "water washing" → "hydrochloric acid/aqueous hydrogen peroxide" → "water washing" → "hydrofluoric acid treatment" → "water washing". Only after the hydrofluoric acid treatment is a thermal silicon oxide layer formed on the Si wafer. Further, there is no disclosure or suggestion of a separate or sequential treatments with ammonia and hydrogen peroxide. Still, further, the reference does not disclose that the treated surface is either a silicon oxide film or a silicon nitride film (see original claim 2 and new claims 17 and 18). Accordingly, further removed from anything disclosed by the Kokai reference is treatment of a surface at which both such a film and a semiconductor or a metal is exposed (claim 18). The surface treated in the Kokai reference is silicon.

The rejection for obviousness is also traversed for the reasons which follow.

Regarding claims 8-10 and 12, the character of the surface prepared in accordance with the Kokai reference will differ from that resulting from step (a) because the "ammonia/hydrogen peroxide" step of the Kokai reference is followed by a number of subsequent steps including treatment with hydrofluoric acid. Accordingly, even if the thermal CVD process of Ikakura et al - EP 1058301 is employed to deposit a film on a surface prepared as taught by the Kokai reference, the process will not be the equivalent of that defined by claim 8 here because its surface will be of a different character.

Claims 16-20 are further removed from anything suggested by the references than are claim 8 and the claims dependent thereon. Note that claim 16 requires separate steps of treating with the etchant followed by treating with the oxidizing agent, a sequence in no way suggested by either the Kokai reference or Ikakura et al. Again, even if the film forming step of Ikakura et al were to follow the preparation steps of the Kokai reference, that film would be formed on a surface of a different character than in the process of the present invention.

Regarding claims 21 and 22, neither the Kokai reference nor Ikakura et al teaches formation of a thermal silicon oxide film on a surface as formed by contacting a silicon nitride film with aqueous hydrogen peroxide. The Kokai reference does not teach either of (1) the use of hydrogen peroxide alone, or (2) formation of an insulating film on a surface as obtained by a hydrogen peroxide treatment. The Ikakura et al reference does not treat any surface with

hydrogen peroxide for any reason. In this connection, it is noted that at the top of page 7 the examiner asserts that Ikakura teach preparation of a mixed solution of ammonia, hydrogen peroxide and water, citing Fig. 3, paragraphs 23-25, 58-66 and claims 1-3 and 8 of Ikakura et al. However, a review by the undersigned and a review by the applicants find no such teaching or suggestion in any of these teachings of Ikakura et al cited by the examiner. It does not appear that Ikakura et al teach or suggest the use of any oxidizing agent for preparation of a surface to receive film deposition by thermal CVD.

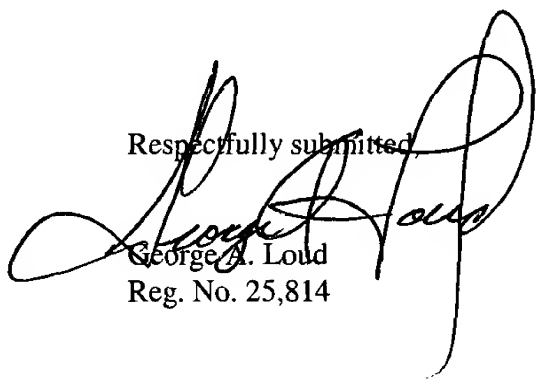
Claims 23 and 24 require heating of a solution containing ammonia and hydrogen peroxide. Further, even if the ammonia/hydrogen peroxide of the Kokai reference were to be heated, and used to treat the silicon surface, again note that that treatment is followed by other treatments including use of hydrofluoric acid. Accordingly, even if the thermal CVD film of Ikakura et al were to be formed on such a surface it would not be a surface "as obtained in step (c)."

Further, with regard to the issue of obviousness, as noted above, the examiner's assertion that Ikakura et al teaches heating a mixed solution of ammonia and hydrogen peroxide does not seem to be supported by any of the teachings referenced by the examiner. Further, the examiner's assertion at the bottom of page 6 that Ikakura et al teaches the addition of nitric acid in paragraph 36 seems to be a mistake in that paragraph 36 Ikakura et al nowhere mentions nitric acid.

Finally, the rejection for obviousness based on a combination of the Kokai publication and the EPO publication in the name of Ikakura et al is traversed for the reason that the Ikakura et al publication dated December 6, 2000 is not prior art against applicants' claims 16-22.

In conclusion, it is respectfully requested that the examiner reconsider the rejections of record with a view toward allowance of the claims as amended.

Respectfully submitted,


George A. Loud
Reg. No. 25,814

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LORUSSO & LOUD
3137 Mount Vernon Avenue
Alexandria, VA 22305

(703) 739-9393

Please rewrite claims 8-10 and 12 as follows:

8. (Amended) A semiconductor device manufacturing method comprising the steps of:

(a) contacting [exposing] a [film-forming] surface of a silicon oxide film with [to] an aqueous solution containing any one of NO_2^- and NO_3^- ; and

(b) forming an insulating film on the [film-forming] surface as obtained in step (a) after the film-forming surface is contacted with [exposed to] the aqueous solution.

9. (Amended) A semiconductor device manufacturing method according to claim 8, wherein a mixed solution containing [an] ammonia (NH_3), [a] hydrogen peroxide (H_2O_2), and [a pure] water (H_2O) is employed as the aqueous solution.

10. (Amended) A semiconductor device manufacturing method according to claim 8, wherein [a] nitric acid (HNO_3) is added to the aqueous solution.

12. (Twice Amended) A semiconductor device manufacturing method according to claim 8 [6], wherein the insulating film is a silicon-containing insulating film which is formed by a thermal chemical vapor deposition employing a reaction gas that contains [an] ozone [-containing gas] and tetraethylorthosilicate.